The Relationship of Team Goals and Team Strategies to Team Performance

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Six studies were conducted under the contract. Four were laboratory studies and two were field studies. The common theme of the studies was the relationship of team goals and team strategies and tactics to team performance. Each study explored these relationships from a different perspective.

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Overview

Six studies were conducted under the contract. Four were laboratory studies and two were field studies. The common theme of the studies was the relationship of team goals and team strategies and tactics to team performance. Each study explored these relationships from a different perspective.

Laboratory Studies

Study 1. Our first study was originally designed to determine whether certain group processes, specifically constructive disagreement, would enhance group decision quality. However, in a pilot study we found that group discussion yielded no benefits. We discovered that group discussion does not help when the group members lack firm knowledge of the facts required to make sound decisions, including the knowledge that their beliefs are correct. A group member may have a correct hypothesis but not know it is correct and be swayed to change his mind by other, less knowledgeable, group members.

Upon discovering this, we changed the focus on our study from group discussion to knowledge seeking from an external source. The task we used was "Lost in the Wilderness," a variant on the well known "Lost on the Moon" task. Group members have to rank 15 objects in order of their usefulness to group survival. In our task, relevant objects included steel wool, a compass, whiskey, a knife, etc. The usefulness of the objects depended on another meta-decision the group had to make, whether to stay with the downed plane or walk out. The groups' performance was measured by the degree of deviation between their ranking and the ranking of experts. Groups could seek information by "buying" clues (e.g., steel wool will support a flame even when wet) in return for points subtracted from their score.

We ran fifty-six 3-person groups. Half were assigned hard performance goals and half easy goals. Furthermore, half were put under time pressure (by giving them less time) and half were not. We measured team-set goals, team efficacy and perceived time pressure as well as number of clues sought and the groups' meta-strategy (stay or leave).

We found that the most direct determinants of performance were the number of clues sought and the meta-strategic decision to stay with the plane (which, according to experts, was the correct decision). Clue seeking was affected by team goals; teams with higher goals sought more clues, presumably because they needed more information to be able to succeed. Teams with high perceived efficacy set higher team goals. Perceived time pressure had a borderline negative effect on team efficacy.

This was the first team goal-setting study to point to the importance of knowledge (clue) seeking as a prerequisite to performance effectiveness. In fact, knowledge seeking completely mediated the effect of goals and efficacy on performance, demonstrating that motivation without knowledge is useless. We believe that the importance of this phenomenon has been greatly under-emphasized in the motivation and group literatures. We also believe it has implications for organizations considering the prevalence of the NIH ("not invented here") syndrome that often retards individual and organizational learning.

Our study revealed the critical important of knowledge seeking in another way. We conducted two, very complex and detailed analyses of all the interactions among team members using videotapes and transcripts (a process that took over a year). None of these analyses (other than the team opinion regarding staying with the downed plane or leaving) revealed anything that was related to team performance. This reinforced our view regarding the primacy of team knowledge as a cause of team performance.

This was also the first goal study to demonstrate that there is more than one type of strategy relevant to team performance; in this case both task and meta-strategy were important.

Study 2. Our second study also examined team goals and team efficacy but with two new elements added: leadership style and team tactics. The most frequently studied aspect of leadership has been the allowing of subordinate participation in decision-making. Participation has had a long and contentious history in psychology, but recent work suggests that the main benefits of participation do not lie in the realm of motivation but rather in the realm of cognition. Specifically, participation encourages knowledge exchange, which, when team members possess (and know they posses) or can discover relevant task information, can lead to better coordination and performance.

The concept of tactics must be distinguished from that of strategy. In the military strategy refers to large military movements whereas tactics refer to the deployment of local forces. Since we used a tank battle simulation in this study which involved attacking enemy pillboxes, the term tactics is most suitable for our study.

We used 72 three-person teams that played a simulated computer game called BOLO. Each team member controls a tank and the task is to attack enemy pillboxes without undue tank losses. The pillboxes are best attacked as a team. Tank losses can be replaced but at a penalty. Teams have to traverse varied terrains, utilize natural cover, and plan for refueling and re-arming and work together to attack the pillboxes at different angles. Teams received a certain number of points for each pillbox destroyed less a penalty for each tank lost.

Half the teams were assigned a hard goal in terms of the number of net points attained, while half were assigned an easy goal. Further, half the teams were assigned a leader playing a commander role and half had a leader playing a coordinator role. The commander role required the leaders to tell the other group member what to do and subordinates were required to follow the leaders' orders. Commanders were selected from the subject pool based on their expressed desire to "take charge" (measured with a questionnaire). The coordinator role required the leader to communicate with all team

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members and help coordinate their activities. Sex ratios of all teams were counterbalanced.

After training and practice sessions, teams played the BOLO game (which we modified from its original version by deleting all enemy tanks) for two 15-minute periods. In addition to measuring team set goals and team efficacy, we measured, through direct observation, the tactics the teams used to attack the pillboxes. We found six key tactics to be most critical to teams success (e.g., attacking simultaneously, attack from different directions) and developed a summary quantitative measure of tactic quality.

We found that the coordinator style led teams to develop significantly better tactics than the commander style. This was probably because BOLO was a new task for all the participants and thus learning how to coordinate through extensive communication was critical. There was a strong association between the quality of team tactics and team performance.

Team-set goal difficulty was affected both by goal assignment and by team efficacy. Teams who set high goals performed significantly better than teams assigned easy goals. However, there was an important interaction between goals and tactics. Among teams with the best tactics, there was a strong association between level of goal difficulty and team performance. Among teams with moderately good tactics, the association between goal difficulty and performance was weaker, and among teams that used poor tactics, there was no relation between goals and performance.

This was the first study to demonstrate the cognitive benefit of participation (separated from motivation) at the team level, the first study to measure goals and tactics at the team level, and the first to obtain an interaction between goals and tactics. More broadly, this study adds to our knowledge, as did our first study, of the varied ways in which knowledge and motivation combine to produce effective team performance.

Study 3. Our third study again examined team goals and efficacy, but added the dimensions of strategic risk, incentives, and tactics. Although there is a substantial goal-setting literature, none of the previous studies have examined whether goals affect risk-taking behavior and, if so, how. In addition, since in the real world, risk-taking behavior and goal achievement are usually connected with reward, we also wanted to examine how goals and incentives might relate to affect risk-taking behavior. Finally, we wanted to look not only at the effects of incentives but also whether the order in which incentives were offered made a difference.

As noted in the discussion of the Study 2, there must be a distinction made between strategy and tactics. In Study 2 we focused on tactics as the most important element. However, in this study, we were also interested in both and so used measures for both strategy (specifically strategic risk) and tactics and looked at how goals and incentives affected each.

As in the previous study, we used the BOLO tank simulation, and the fundamental tasks and skills were the same, and a similar scoring system was used. We ran 88 three-person teams through the study. The study design was a 2x2x2, repeated measures design with goals and incentive order as the two between-subjects factors and incentives as the within-subjects factor. Half of the teams were assigned a difficult goal (in terms of the number of net points attained) and half were assigned an easy goal. In addition, half of the teams were offered a monetary incentive for goal attainment in the first experimental session while the other half were offered the monetary incentive for goal attainment in the second session. Because we wanted to simulate a real work team environment as much as possible, we did ask subjects to sign up in teams with friends or people that they had worked with previously.

After training and practice sessions, the teams played BOLO for two experimental sessions. Each session lasted 10 minutes. We took measures from the teams for perceived efficacy and strategic risk. In addition, through direct observation, we took a second

measure of strategic risk and one for tactical quality. The measure for strategic risk was based on a priori evaluations of the difficulty associated with each pillbox (e.g. an isolated pillbox was less risky to attack than one in close proximity to others) and the measure of tactical quality was based on the six important tactics identified in Study 2. Teams were required to attack pillboxes as a team, and individual action was discouraged through the use of penalties. For purposes of external validity, the scoring system was designed so that riskier targets earned great payoffs in terms of points. However, we were also careful to design the study so that teams could achieve the difficult goal without necessarily choosing a difficult strategy. As in the previous study, tactical quality was critical to successful performance.

We found that difficult goals did lead teams to choose riskier strategies, and that riskier strategies did lead to higher performance. As in Study 2, we found that higher quality tactics also led to better performance. We also found that efficacy was positively related to strategic risk.

While there was no main effect for incentives, there were interesting interaction effects. For example, the within-subjects ANCOVA analysis indicated two significant two-way interactions (goal difficulty x incentive and incentive order x incentive) and a significant three-way interaction (goal difficulty x incentive order x incentive). Examination of the means from each cell of the study design indicated that the effects were primarily due to the easy goal teams. Easy goal teams took less risk when offered the incentive than when not offered the incentive. This was not true for subjects with hard goals. We also found that the addition of a monetary incentive had no effect on performance regardless of goal condition. However, the subtraction of incentives significantly reduced performance for teams in the difficult goal condition.

This was the first study to look at the effects of goals on risk, the effects of incentives on risk, and the influence of incentive order on risk and performance. Basically, we found that goal difficulty increases risk but that incentives decrease risk for those with easy goals. Incentives also enhanced the quality of the tactics used.

Study 4. Our fourth study explored, along with goals and tactics, the performance effects of task interdependence and pay interdependence at the level of the "division," defined here as an organizational unit composed of multiple teams. Task interdependence refers to how much teams must interact with and depend on other teams to accomplish their work, and pay interdependence refers to how much incentive pay is determined by division-level measures of performance (rather than by individual- or team-level performance measures). A commonly-held view is that higher performance will result when task interdependence and pay interdependence are in alignment (so that incentive pay is individually-based when individuals work independently, team-based when team members work interdependently, and division-based when teams work interdependently with other teams), though very little research has been conducted to support this view.

The study also examined relationships among task interdependence, pay interdependence, and two variables through which task interdependence and pay interdependence were hypothesized to have their effects on division performance, namely, goal priority (i.e., whether priority was given to division-level goals over team-level goals) and inter-team cooperation (i.e., the degree to which teams shared information and helped each other accomplish the task). Further, an expanded model was tested that included, in addition to the variables noted above, goal difficulty and task implementation tactics.

In a 3 x 3 laboratory experiment, 90 divisions composed of two three-member teams performed the computer simulation BOLO during two work sessions, randomly assigned to one of three levels of task interdependence: independence (teams worked

independently of other teams), hybrid interdependence (teams worked somewhat independently and somewhat interdependently), and full interdependence. Divisions also worked under one of three variable pay structures, in which a monetary bonus paid to participants was based upon measures of team performance only, both team and division performance, or division performance only.

Unexpectedly, we found that task interdependence negatively affected performance, which suggested that the experimental task was easier in the task independence condition. We found no direct effect of pay interdependence on performance, and no interaction between task interdependence and pay interdependence. These results thus failed to support the proposal that higher performance results from the alignment of pay interdependence and task interdependence. This may have been due to inadequacies in the experimental procedures employed, or it may have been due to limitations in the theory behind the prescription of alignment. The alignment of pay interdependence with task interdependence, in isolation, may be inadequate to determine performance; other factors that influence performance (such as motivation and competency) may need to be taken into account as well.

We found that pay interdependence affected goal priority, which, in turn, influenced inter-team cooperation. Similarly, task interdependence had direct effects on both goal priority and inter-team cooperation. Thus, working interdependently and receiving division-based pay led teams to view division goals as more important than team goals and to share information and help each other.

In Session 1 only, inter-team cooperation negatively influenced division performance. In Session 2, however, an interaction was found between task

interdependence and inter-team cooperation, so that cooperation had positive performance effects in the task interdependence condition. These results suggest that cooperation is not always productive, and that teamwork may be useful only when the task truly requires it. For independent tasks, allowing individual teams to work autonomously may lead to higher productivity.

Goal difficulty, which was negatively affected by task interdependence, had positive effects on both tactics and performance in Session 2 only. This result was likely due to a learning-curve effect; high motivation to perform was ineffectual in Session 1, until participants had worked long enough to gain competence at the task (in Session 2). Division tactics, which were negatively influenced by task interdependence and positively influenced by both pay interdependence and goal difficulty (in Session 2), had a positive effect on performance.

Overall, this study suggests that the results of task and pay interdependence are inherently neither beneficial nor detrimental to performance. Here, task and pay interdependence clearly influenced goal priority and cooperation, but the link to performance was tenuous. These results suggest that the alignment of the two may be insufficient to predict performance unless other factors are considered as well. As found previously, both goals and tactics facilitated team performance.

Field Studies (by Ellie Weldon)

Study 1. This study tested the roles of formal proactive, planned change; informal, ad hoc emergent change; and individual champions in the development of task strategies in empowered work groups. The groups were workers in a steel mill.

Case studies of strategy development in four groups were produced. To collect information about strategy development, group members were asked whether the products they produce or services they provide had changed in the last year. We also asked if they had changed the way they do their work. If changes had been made, we asked a series of questions to determine how the idea was developed and how the change was implemented.

The interview data were used to construct a description of each change. Each change was characterized along five dimensions: (a) the target of the change; (b) impetus for change; (c) integration with work activities; (d) the source of the idea; and (e) who was involved in developing and implementing the change. The target variable indicates whether the change involved a product or service; work procedures; infrastructure; or group process. Impetus indicates whether the process was proactive or reactive. Integration indicates whether strategy formation was separate from normal work activities; integrated into normal work activities; or both. The development and implementation variable indicates who was involved in developing the idea, making the decision to adopt it, and implementing the change. Two judges assigned one category on each variable to each change. Cohen's kappa (a measure of inter-judge agreement) was quite high for each variable.

The results showed that:
a) changes were used most often to increase the quality of the work (32%), increase the quantity of work (27%), decrease through-put time (18%), and decrease effort and stress (18%).

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b) most changes targeted work procedures (50%) or infrastructure (32%).

c) most (77%) changes were reactions to an existing problem.

d) strategy development was usually integrated with normal work activities (68%).

e) 32% of the changes were produced by a pure ad hoc, emergent process (i.e., reactive and integrated), and only a few (14%) were produced by pure deliberate strategy formulation (i.e., proactive and separate). Overall, changes were more likely to be produced by a mixed process (54%) involving aspects of ad hoc formation and deliberate strategy formulation.

f) an individual group member was the most frequent source of an idea for change (41%), followed by group discussion (32%),

g) individual actions played an important role in the development and implementation of 36% of the changes.

As these results show, ad hoc, emergent processes play an important role in strategy development in empowered work groups. Group members rarely searched for problems to solve or opportunities to exploit. Instead, team members acted on ideas as they developed and reacted to problems as they arose. Moreover, strategy formation was typically integrated into ongoing work processes. These data also show that individual champions play an important role. Many changes began as individual ideas and individual follow through was often important.

These data provide the foundation for a theory of strategy development in empowered teams. As these data show, this theory must include ad hoc, emergent processes in addition to formal proactive processes. The role of individual champions should also be acknowledged.

These data suggest that tools used by human resource professionals to improve group processes are too narrow to facilitate the full range of behaviors that contribute to strategy improvements in empowered teams. Currently, these tools (i.e., selection tests; group training; group decision support systems) are designed to facilitate formal, proactive, whole-group problem solving. Although these tools can be useful, tools that facilitate

informal, ad hoc, emergent processes should also be developed. Organizational systems that promote a sense of individual responsibility for group success should also be used.

Study 2. This study examined the effects of short-term and long-term goals on strategy development and group performance. Several previous studies have shown that setting proximal performance goals in addition to distal goals can produce better performance than distal goals alone. In this study, we extend our understanding of proximal goals by testing one variable believed to mediate this effect. Based on Bandura's belief that proximal goals provide opportunities for workers to evaluate their progress toward the distal goal and adjust their strategies when necessary, we hypothesized that team members working toward proximal and distal goals would perform better than teams working toward distal goals alone, because team members invest more time and energy in efforts to develop more effective task strategies.

Thirty-one teams of nurse surveyors (nurses who inspect nursing homes and homes for the developmentally disabled) employed by two districts of a State Department of Health participated. These nurses work together to inspect these homes and write a report to document deviations from state and federal requirements (called deficiencies). Their documentation must meet the principles of documentation published by state and federal regulatory agencies. Management hoped that performance goals could be used to increase adherence to these principles (called accuracy of the documentation).

Each team was randomly assigned to one of the two interventions. The fifteen teams in the short-term-plus-long-term-goal condition, set a long-term performance goal (the level of accuracy they would ultimately achieve over the six to nine months) and one or two short-term goals to serve as intermediate steps. The sixteen teams in the long-term-goal condition set only a long-term goal.

Strategy development was measured with six items asking each group member to indicate the extent to which she talked to other group members to solve work problems, develop better ways to do their work, and develop ways to increase the accuracy of survey

documentation. *Post-goal performance* was defined as the accuracy of the documentation each group produced, and it was measured by the percent of all deficiencies reported that were supported by correct documentation. *Goal level* is the actual value of the long-term goal set by the team (i.e., percent accuracy to be achieved).

The zero-order correlations among the variables produced one unexpected result -- the correlation between goal level and condition was significant, showing that team members who set short-term goals in addition to long-term goals set more difficult long-term goals, which suggests this revised model:

Condition → goal level → strategy development → performance
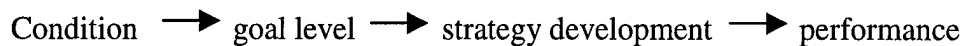
This model was broken into two mediated relationships, and James and Brett's procedure for testing mediation was used to test each one. Results showed that goal level mediates the relationship between condition and strategy development, and although goal level influences strategy development, strategy development does not mediate the relationship between goal level and performance; rather goals affected performance directly. Additional tests showed that goal level mediates the relationship between experimental condition and performance.

This study is important because it shows that proximal goal setting actually affects goal difficulty; it can motivate group members to set more difficult long-term goals, which increases the level of performance they ultimately achieve. Failure to find an important role for strategy development is inconsistent with earlier studies showing that strategy development mediates the relationship between group goals and group performance. Although this result suggests that strategy development did not contribute to improved group performance in these groups, interviews with team members, their supervisors, and the department head indicate that strategy improvement did play an important role. For example, one team in the short-term-plus-long-term-goal condition worked with its quality review person to develop a series of "cheat sheets" that listed the correct approach to its most frequent errors. These "cheat sheets" spread to other teams through the team's supervisor, who instituted the innovation in other teams under her direction, and then told other supervisors, who also adopted the change. Thus, strategy development improved

performance, but a strong correlation between strategy development and performance was not found, because all teams benefited from the strategies developed by any one team.

Overall Summary

These six studies suggest the following conclusions:
- While team goals sometimes have a direct effect on team performance, most often goals affected performance through their effects on or in conjunction with team strategies (such as knowledge-seeking and risk-taking) and team tactics;
- Discovery and use of effective strategies may be affected by many factors, including goals, leadership style, incentives, task interdependence, and encountered problems;
- Strategies and tactics have independent effects on team performance.

Current Status of Articles Based on above Research

Laboratory Studies

#1: Under resubmission to the *Journal of Organizational Behavior*.
#2: Published in *Organizational Behavior & Human Decision Processes*, 1997, V. 72, (2), 203-231. (C. Durham, D. Knight and E. Locke, "Effects of leader role, team-set goal difficulty, efficacy and tactics on team effectiveness.")
#3: Under revise and resubmit at *Academy of Management Journal*.
#4: To be submitted.

Field Studies

#1: Under revise and resubmit at *Group & Organization Management*.
#2: To be submitted.

In addition, one theoretical article was published under this contract:

E. A. Locke (1997) The motivation to work: What we know. *Advances in Motivation and Achievement,* V. 10, 375-412. JAI Press.